TRANSACTIONS

OF THE

ILLUMINATING ENGINEERING SOCIETY

FOUNDED IN LONDON 1909 INCORPORATED 1930

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NOVEMBER 1937

32 VICTORIA STREET
LONDON SW1

NOTES ON RECENT MEETINGS AND EVENTS

Opening General Meeting in London.

The opening meeting in London took place at the E.L.M.A. Lighting Service Bureau (2, Savoy Hill, London, W.C.2), on October 12. As usual members and friends were afforded a preliminary view of the exhibits illustrating progress in illumination and photometry at 4.30 p.m.

At the subsequent meeting, which commenced at 5.30 p.m., the minutes of the last meeting were taken as read. In view of the large number of applicants for membership, as recorded in the last issue of the Transactions (pp. 136 and 141) the list of names was not read but was exposed for inspection of members.

The new President (Dr. S. English) was then introduced by the retiring President (Mr. A. Cunnington). Dr. English conveyed the cordial thanks of the Council and Members to Mr. Cunnington for his services as President during the past session.

The usual award at the opening meeting was then made. Mr. G. T. Winch and Mr. L. C. Jesty received the Gester Memorial Premium for their paper entitled "Television Images: An Analysis of their Essential Qualities" read at the meeting of the Illuminating Enginering Society on April 13, 1937.

The President then delivered his address, which will be found *in extenso* on pp. 145-148.

After an interval for refreshments the various exhibits (See pp. 149-150) were briefly presented and described. A vote of thanks to the exhibitors and to the E.L.M.A. Lighting Service Bureau for their hospitality terminated the proceedings.

Sectional Meetings in London.

Industrial Lighting Section.

During the past month two sectional meetings have been held.

On October 19 an address on "The Economics of Factory Lighting" was given by Mr. A. E. Iliffe, at a meeting of the Industrial Lighting Section, held in the Lecture Theatre of the Junior Institution of Engineers. Mr. R. O. Ackerley presided. The address, which dealt in a general manner with the relation of lighting to safety and production and raised a number of questions on which an impartial view from the standpoint of the economist is needed, led to a keen discussion, following which a cordial vote of thanks to Mr. Iliffe was carried with acclamation.

Public Lighting Section.

The first meeting of the newly formed public lighting section was held at the invitation of the General Electric Co., Ltd., in their research laboratories at Wembley, on October 29. Dr. C. C. Paterson, the director, welcomed the party. Mr. F. C. Smith, who presided, then briefly summarised the objects of the section and invited anyone interested to send in their names to its honorary secretary (Mr. K. N. Hatton). Dr. C. C. Paterson then delivered his inaugural address in the course of which he reviewed problems in exterior lighting and especially those arising in connection with public lighting. Brief contributions to the discussion were made by the President (Dr. S. English) and the hon. secretary (Mr. J. S. Dow). A cordial vote of thanks to Dr. Paterson for his paper and to the General Electric Co., Ltd., for their hospitality was moved by the chairman and declared carried unanimously.

Members were then given an opportunity of inspecting the Illumination Extension of the research laboratories, and subsequently assembled in the adjacent experimental roadway where various alternative systems of street lighting, in conjunction with different species of road-surfaces, could be seen in operation.

Meetings of Local Centres.

North-Western Area.

Following a visit to Chester to inspect the illuminations on October 4, the opening meeting in this area took place in Manchester on October 19. There was a representative display of lighting apparatus on view. An address, summarising recent progress in the lighting field, was delivered by Mr. A. Cunnington, who had come up to Manchester specially for the purpose.

North Midland Area.

The opening meeting in the case of this section was held somewhat early in the session, on September 20, when there was a display of lighting equipment. An address reviewing progress in illumination was delivered by Mr. A. W. Beuttell, likewise a visitor from London.

At the subsequent meeting on October 18 an address on street lighting was given by Mr. J. F. Colquhoun, who dealt mainly with requirements of main roads, and visualised sources mounted 25 ft. high furnishing about 5,000 lumens per 100 ft. of linear surface. The discussion was opened by Mr. R. G. Widdery, who emphasised the need for greater uniformity and for guidance from some central authority, whilst others discussed in some detail the comparative economic merits of electric filament and discharge lamps.

Scotland.

At the opening meeting in Glasgow on October 13, Dr. S. English delivered an address entitled "New Angles on Street Lighting." At the subsequent meeting on November 4, over which Mr. S. B. Langlands presided, there was an entertaining display of lighting equipment, twenty-eight different lighting units being on view. Prior to the exhibition Mr. Alexander Lindsay was elected chairman, and Mr. E. J. Stewart, vice-chairman, and a cordial vote of thanks to Mr. Langlands for his efforts on behalf of the Centre was passed.

Irish Free State.

The first meeting of the session, on October 5, was devoted to an address by Mr. E. J. Davidson on "The Fundamentals of Lighting."

PRESIDENTIAL ADDRESS

By S. ENGLISH, D.Sc., F.I.C., F.Inst.P.

(Address delivered at the Opening Meeting of the Illuminating Engineering Society, held at the E.L.M.A. Lighting Service Bureau, 2, Savoy Hill, London, W.C.2, at 5.30 p.m. on Tuesday, October 12th, 1937).

My first and most obvious duty is to try to express to you my appreciation of the great honour you have conferred upon me in electing me as your President for the Session that is just commencing.

On looking through the list of my predecessors, I realise that they were all men of sterling worth—men who had made names for themselves as experts in one branch or another of the industry, and who had well and truly served the Society over a number of years. Needless to say, I am proud to join such a group of leaders, and my association with them will, I feel, inspire me to give myself fully to the service of the Society during the ensuing year.

Looking through the list of Presidents a second time fills me with dismay—I am the thirteenth! I am not in the least superstitious, but this aspect compels me to realise that being elected your President is not all "honour and glory." It is at the same time a sentence to twelve months' hard labour. It was only through continuous, conscientious hard work—day and night—that your past Presidents have held aloft the Society's banner and raised the Society's prestige to the high level at which it stands to-day. As the years go by, this task gets no lighter I already have a glimmering of what lies in front of me, but I know that I can rely on the active support of our indefatigable Honorary Secretary, Mr. Dow, and all the members of the Council. I know also that I can rely on my predecessors for sympathetic support and advice on many matters that are sure to arise during the next twelve months. With such a band of helpers and advisers surrounding me, I feel I need not take too seriously the ominous number thirteen.

One of my predecessors, Mr. Hepworth Thompson, with whom I had the good fortune to be associated prior to his retirement from business, in his presidential address made several very valuable suggestions regarding the organisation of the Society. After consideration in committee, in Council, and in general meeting, several of these suggestions were adopted and put into operation as opportunity arose, while others, though admittedly of value, were thought to be a little too ambitious for the Society at the present time. Mr. Thompson's great aim was to raise the status of the Society until it was recognised as *the* non-commercial body that represented both the art and science of illumination in Great Britain. By the adoption of some of his suggestions, something has already been accomplished, but the goal has not yet been reached. I shall look forward, through the work of the Council—its committees—and the ordinary members of the Society, to an accelerated pursuit of this aim, for we must all realise that the status that the Society enjoys is not something that can be acquired from outside, but is a delicate structure that is built up within the Society itself and is dependent on the activities of individual members. If every one of us individually, whether as ordinary members of the Society or as members of committees or the Council, was determined to help forward the Society whenever opportunity offered. then we should quickly develop a sense of unity and a body of enthusiasm that would see us well along the road to achieving our more immediate aims.

If I may, I would like to refer to two possible ways in which we might do something towards raising the standing of the Society, both in the estimation of members themselves, in the lighting industry generally, and also in the estimation of people who can appreciate the value of a well organised technical Society.

Research—Papers—Transactions.

It has already been pointed out that one of the most effective ways of raising the standing of the Society would be by raising the standard of the papers presented to the Society and published in its Journal. Please do not think that I am criticising the quality of the papers that the Society has listened to and published during recent years, but rather that I would like to see to some extent a change in the type of paper presented to the meetings of the Society. I would like to see more original papers describing and giving the results of research work on illumination problems, given by the investigators themselves or their associates. The discussion and publication of such papers at frequent intervals would gradually raise the standard of our "Transactions" to such an extent that they would come to be a mine of information, and would be referred to by anyone seeking up-to-date information on lighting problems. We could then look forward to the time when British authors of papers would regard our "Transactions" as the natural means of publishing any papers of suitable quality and character dealing with the investigation of an illumination problem.

It may be argued that there are not available sufficient original papers dealing with research and development work to keep the Society well supplied. Without disputing such a statement, it is obviously the duty of the Society to encourage and foster research work on all kinds of problems pertaining to the industry. Even within our own circle we now have excellent opportunities, for with the formation of technical sections we can gather together just those members who are intensely interested in a particular aspect of illumination. Such members, who are specialists, can obviously discuss the details of the technique of their subject better than we can in general meetings of the Society. Discussion of these details may of itself help to solve the problem under review, or it may help to define a problem

which previously had been nebulous, and thus enable members to get to grips with it—or perhaps it may reveal one aspect of a problem that had not previously been investigated, or reveal an avenue of approach that promises interesting and perhaps useful results. In any case, discussion should be followed by further investigation, and when this investigational work has been completed it should be communicated to a meeting of the section concerned, and the subject once more discussed in the light of the new data.

I would here like to appeal to those senior members of the Society, who are in a position to do so, not only to give their assistants an opportunity to do a little investigational work under suitable guidance, but to encourage them to undertake such work. It is an excellent training, for if carried out systematically it will, among other things, impress on them the vital necessity of maintaining a critical and impartial attitude, and of avoiding that measure of self-deception which is apt to creep in unless a vigilant watch for it is maintained. In such an industry as ours, where we have constantly to make a choice between different systems and methods of lighting, an impartial and scientific outlook is specially desirable, even on the part of those who are personally identified with a particular system of lighting.

In order to operate a scheme of the nature outlined above, I would like to suggest to the committees responsible for the organising of the work of the technical sections that they should not always follow the example of the general meetings of the Society in having one paper occupying the whole evening for its reading and discussion, but that they might well develop their present tendencies by devoting the majority of their meetings to the reading and discussion of two or three short papers all dealing with one particular problem, but necessarily presenting different points of view. In this way members will be able to help one another to a very considerable extent, and the sections will, almost without knowing it, become the instigators of investigational work that in the long run is bound to lead to definite progress. Such a scheme, when well established, would provide many suitable papers for sectional meetings, and, in my opinion, it would occasionally produce papers of the type that would be welcomed at general meetings of the Society.

For other papers of the same type, but on subjects not covered by our technical sections, the Society could look to the same very wide range of experts that occasionally present papers to us. It is interesting to speculate on how wide is the field of sciences that border on our own particular field of investigation. For example, Sir John Parsons stated, in discussing a paper presented by Dr. Lythgoe, that in no field of science were so many types of scientific workers involved as in the study of visual processes; and again, those of us who have seen the numerous processes that are involved in the manufacture of electric lamps—of the filament and discharge types—realise what an enormous amount of research is involved in fields as wide apart as the highly theoretical atomic physics at one pole and the very practical glass technology at the other pole. Similarly, photometry, which in theory used to be a simple procedure, has now become involved in electron-physics and colormetry. In fact, in every branch of illuminating engineering we find contacts with one or other sister science, and it is interesting to see how often investigators draw upon their knowledge of one branch of science to help to solve problems arising in the other. Let me give you just one example.

Some fifteen years ago, when working on the relationship between the composition of glass and its viscosity, I happened to find that when certain boric oxide containing glasses were held at a constant temperature, at or slightly above their annealing temperatures, their viscosities increased asymptotically to a constant value. As there were no signs of devitrification, it was assumed that this increase in viscosity was caused by some molecular rearrangement. The facts were recorded and, as they were not material to the work in hand, were left on one side for further investigation later. As an opportunity of investigating this phenomenon further did not arise, a note of the results so far obtained was included in a paper published in 1928,* and there apparently, so far as I was concerned, the matter ended. This was not to be, for during recent years I have used a boric oxide containing glass for making band and dish refractors for use in gas street-lighting lamps. After the first teething troubles were over, the behaviour of the glass was perfectly satisfactory, even when used in conjunction with high-pressure gas lamps. Then, after two or three comparatively trouble-free years, there came an unexpected epidemic of breakages. The composition of the glass had not been altered—the size and shape of the refractor glasses were the same, and the annealing of the glass, when tested in a polariscope, appeared perfect. Investigation revealed two possible causes of the trouble, viz., (1) owing to furnace trouble, the manufacture of these refractors had been transferred from the usual furnace to another and, as a result, they underwent a somewhat different annealing schedule, and (2) in some cases new moulds were being used. A series of four tests was devised to try to find the cause of the trouble, and, remembering the curious behaviour of similar glasses already mentioned and the possibility of a molecular rearrangement being indicated, one of these tests involved putting a number of refractors through a special annealing schedule, designed to permit of any possible molecular rearrangement being completed before the actual cooling process began. Thirty-six glasses thus treated were put into ordinary service and kept under observation, three of our largest gas companies kindly co-operating with us in this part of the investigation. In the first three months' test period only one of these glasses was reported as having fractured, and it was admitted that the failure was due to a combination of two unusual circumstances: (a) the gas pressure was running higher than standard, and (b) a mantle had broken and permitted a finger of

* J. Soc. Glass Tech., 1928. XII. Proc. 106.

flame to impinge on the refractor glass. During the second test period of three months, not a single failure of any of these glasses was reported, so that it appears possible that the modified annealing schedule based on casual observations made some fifteen years ago may have removed one of those tantalising causes of the failure of apparently perfect heat-resisting glass.

Other investigators, I am sure, could quote numerous cases in which our science has benefited by contact with other sciences, often in the most unexpected ways. It follows that there are many investigators in various fields who happen to come across facts that would be useful to us, and our problem is how to get those facts known to those of our members who would be able to use them. Obviously, we would like them recorded in our journal, either as communications or as abstracts. If, however, we desire to attract such communications, we must realise that the publishing of papers or notes is the principal way in which investigators become known to their confrères throughout the world, and that there are many authors who prefer to publish their papers in periodicals of high standing and with wide circulations rather than in lesser known periodicals, even though the latter course would bring the paper directly to the notice of those people who would be most likely to find it useful.

This argument seems to indicate still further expansion in the Society's publications. As one result of Mr. Thompson's suggestions we have already taken one big step in the right direction. I refer, of course, to the separate publications of papers presented to the Society in the form of "Transactions." I would like to see this scheme developed further and more money devoted to, or available for, the publication of an increased volume of suitable papers. I am well aware of the financial difficulty, but if from the increased membership for which we are asking there happens to be any funds available, I know of no way in which such funds can be expended to better advantage than in still further raising the standing and value of our "Transactions." We must remember that our publications are all that a large proportion of our members get in return for their subscriptions, and, further, it is by our "Transactions" that the technical world judges us. I feel that if the standing and value of our "Transactions" is still further increased we shall find that that fact alone will attract new members, and, moreover, members of the type we most desire, for having found the "Transactions" of use to them, they feel that they are getting value for their subscriptions, and are, therefore, likely to continue their membership and become really useful members of the Society.

Despite these arguments regarding the spending of more money on our "Transactions," I must emphasise that I do not want to see our publications grow to such an extent that we become a "Journal with a Society," instead of, as at present, a "Society with a Journal," nor do I want to see original papers of interest to a limited number of members occupying an undue amount of the Society's time or space in its "Transactions" to the exclusion of the better type of general paper we have at the present time. It is necessary to achieve a proper balance in this respect, but I feel sure we can safely leave that matter to the discretion of the Editor and the Papers Committee.

There is one other point I would like to emphasise in this connection. Considering that it is less than two years since the separate issue of the "Transactions" was initiated, the arrangement has worked smoothly and well. The additional publicity which the Society receives, in an informal way, in "Light and Lighting" is undoubtedly proving of benefit in making the Society's doings more widely known and in attracting new members. There is, however, a special form of publicity which I would like to see more carefully studied, namely, the bringing of the full account of our work as recorded in the "Transactions" before the specialists and lighting experts of the world. To carry out a piece of research and produce a paper of value involves a considerable amount of work, and when such a paper is communicated to us it is our duty to make the contents of that paper or the outcome of the research widely known. We ought, therefore, to ensure, so far as we can, that our "Transactions" are brought to the notice not only of our own members but of leading specialists in illumination wherever they may be, and that they find a place in the leading scientific and technical libraries at home and abroad.

Education and Training.

May I now turn to the second matter arising out of the suggestions that Mr. Thompson made in his Presidential Address that I have very much at heart: I refer to the technical education and training of young men entering the industry and intending to make it their life's work. As many of you know, there is a strong joint committee, on which this Society is represented, considering this subject, and I have no doubt whatever that they will produce a sound workable scheme such as will serve to guide the studies of our young men and give them a good grasp of the fundamentals of illuminating engineering in its various branches. Since the matter is, as it were, *sub judice*, I will not intrude my views on such a scheme at the present moment, but I will assume that a suitable one has been prepared by the committee and approved by all the bodies concerned. At that stage, I would like to see one of our technical colleges or institutes take its courage in both hands and seriously consider the question of providing lectures and laboratory facilities for illuminating engineering subjects, as distinct from the ancillary subjects, such as elementary mathematics, machine drawing, etc., that will, no doubt, be included in the course of studies but which are already well provided for. If one of our London technical colleges adopted this course, and was fortunate enough to find the proper man to organise such studies—a man with the requisite knowledge, well trained in the methods of teaching and scientific research—a man of unbounded enthusiasm and energy coupled with a wide outlook and the gift of arousing first interest and then enthusiasm in his students—then I feel safe in predicting that he would soon gather around him a body of workers such as would form not only the nucleus of a training school, but also a research school that would fill a

gap in our present system of technical education, and would be of enormous assistance to our young men. It would also be of great value to the industry, and incidentally also to the Society, for such a school would help to develop a well-qualified type of member. When such well-qualified members become available, and when they have had a few years' experience in the industry, preferably under someone of standing in the Society, it would seem advisable for the Society to recognise their standing by the granting of a diploma—or, perhaps, by electing them, along with others of proved merit, to a special class of membership. The conditions governing either of these alternatives will need very careful consideration, and I suggest that as soon as a promising training scheme is put into operation, it will then be necessary for your Council to consider what it will do in either of these directions in order to link up the students with the Society and offer them some distinction or badge of efficiency at which to aim.

I hope that we may, during the forthcoming session, look forward to the inauguration of such a scheme of education and training. If our hopes are realised, we shall witness a landmark in the science and art of illumination in this country, and shall see one cubit added to the stature of the Society.

Whilst unwilling to trespass on ground already covered by my predecessor, Mr. Cunnington, I cannot resist pointing out how vitally this matter of education and professional status affects the serious problem to which he drew attention—that of providing independent experts on illumination, such as might enter the service of government departments, local authorities, and important industrial and transport undertakings. It is a singular anomaly that at the present time so few openings of this kind exist. The anomaly is due to some extent to insufficient recognition of the importance of illumination by such bodies, but it is probably also due, at least in part, to the fact that as yet no " hall mark " exists by which those having a sound knowledge of illuminating engineering may readily be identified.

I have a further excuse for referring to this matter in the fact that since we last met together, " suitable and adequate lighting " has become, for the first time, a definite requirement in the Factory Acts of this country. This step, as we are all well aware, has long been advocated by the present Chief Inspector of Factories, Mr. D. R. Wilson, one of our past presidents, who, for many years, has taken a keen and sympathetic interest in industrial lighting. It is, perhaps, not too much to hope that this notable step, besides giving a great incentive to better factory lighting, will furnish new opportunities for independent experts in this field.

Illumination Convention.

In conclusion, I would like to draw attention to what is doubtless the most outstanding feature of the Society's work within the last few years—the development of the special sections and informal local centres. Their activities for the current session are set out in a printed programme, which will be in the hands of members very shortly.

We have now in operation four Special Sections devoted to photometry, industrial lighting, public lighting, and decorative lighting; we have also four informal local centres with headquarters in Manchester, Leeds, Glasgow, and Dublin, all with complete programmes of meetings for the present year, in addition to the regular monthly general meetings in London. The result is that our programme of meetings has extended from a single sheet to an eight-page leaflet. Whereas, until recently, we were content with eight meetings during the year, provision is now made for about fifty!

This growth is a triumphant indication of the vigour of the Society and the enthusiasm of its members, but it brings in its train another problem. I have already referred to the fact that we are first and foremost a " Society." I feel that we in London want to get to know the members of the local sections and that they want to get to know one another. This object may be achieved by organising a joint conference or convention as suggested by Mr. Dow in an editorial in the August issue of " Light and Lighting " (p. 216). Such a conference or convention might be held annually—preferably about May, and extending over two or three days at a carefully chosen, fairly central resort which would add its own attractions to the more prosaic attractions of the convention itself. Instead of limiting ourselves to papers of the types we have at ordinary meetings, we might break fresh ground and invite someone of standing to address us on a borderland subject. We might also make that the occasion on which we would arrange for an address by a gentleman from overseas. Then with proper attention given to the social side and, perhaps, a visit of technical interest we should have the foundation of a successful venture which would do much towards welding the parent society and the local sections into a homogeneous whole, and would give opportunities for making helpful personal contacts. It is, perhaps, rather late to consider the holding of such a convention during the present session, but if it were delayed until the following session we might then find a difficulty in organising such a meeting during the same year in which a meeting of the I.C.I. in Holland will claim so many of our members.

Despite difficulties, if you think the suggestion a practical one I trust it may receive some consideration.

LIST OF EXHIBITS

On view at the Opening Meeting held at the E.L.M.A. Lighting Service Bureau (2, Savoy Hill, London, W.C.2) on Tuesday, October 12th, 1937.

SUBJECT OF DEMONSTRATION.	SPEAKER OR DEMONSTRATOR.
INTRODUCTION.	
1. (a) New Features at the Bureau.	Mr. W. J. JONES (*E.L.M.A. Lighting Service Bureau*).
(b) Demonstration of a Portable Projector Light Meter.	
SELECTED NOVELTIES.	
2. (a) New Water Cooled H.P. Electric Discharge Lamps.	Mr. W. J. JONES (*E.L.M.A. Lighting Service Bureau*).
(b) New Electric Lamps utilising Fluorescence.	Mr. W. J. JONES (*E.L.M.A. Lighting Service Bureau*).
3. New Types of Glassware giving a special colour effect.	Mr. E. O. H. THOMPSON (*Crompton Parkinson, Ltd.*).
4. A New Type of Low Pressure High Efficiency ("Magnalux") Gas Lamp.	Mr. A. J. WHYTE (*Keith Blackman, Ltd.*).
5. Interchangeable Gas Sign using a special H.P. Decorative Lighting Mantles.	Mr. A. J. PRESTAGE (*South Metropolitan Gas Co.*).
6. Moulded Spiderless Mantles.	Mr. W. BLOWES (*Falk Stadelmann and Co., Ltd.*
6a. New Electric Lamps.	Mr. R. P. SAYERS (*Philips Lamps, Ltd.*).
7. A Double Projection Method for Studying the appearance of artificially lighted Streets.	Mr. J. M. WALDRAM (*Research Laboratories of the General Electric Co., Ltd., Wembley*).
STREET LIGHTING UNITS.	
Gas Units.	
8. New Forms of Low Pressure Gas Lamps (the "8,000 lamp" and "Cut-off" Street Lighting unit).	Mr. A. R. MCGIBBON (*Wm. Sugg and Co., Ltd.*)
9. New Types of Gas Lamps ("Starlyte" and "Spotlight" lamps).	Mr. J. W. LINTOTT (*C. H. Kempton and Co., Ltd.*).
10. New Types of Gas Lamps (New "Maxill" Lamp and Swanneck Lamp for attachment to columns).	Mr. W. J. G. DAVEY (*W. Parkinson and Co.*).
Electric Units.	
11. New Street Lighting Lantern Equipment utilising horizontally burning Electric Discharge Lamps.	Mr. C. W. M. PHILLIPS and Mr. T. CATTEN (*The British Thomson-Houston Co., Ltd.*).
12. Street Lighting Units utilising Horizontal Electric Discharge Lamps.	Mr. E. E. R. PORTER (*Metropolitan-Vickers Electrical Co., Ltd.*).
PHOTOMETRY.	
13. A New Form of Portable Photoelectric Photometer.	Mr. J. S. PRESTON (*The National Physical Laboratory*).
14. A Telephotographic Method for measuring the flashed area of Projectors.	Mr. H. J. A. TURNER (*Research Laboratories of the General Electric Co., Wembley*).
15. New Types of Lanterns for Street Lighting.	Mr. J. G. CHRISTOPHER and Mr. A. G. BROWN (*General Electric Co., Ltd.*).

MISCELLANEOUS FITTINGS, ETC.

16.	A Series of new "Built In" (Controlens) Fittings.	Mr. E. STROUD (*Holophane, Ltd.*).
17.	Various Types of Fittings (Dispersive Reflector, Sign Reflector, Combination Lighting unit).	Mr. W. IMRIE-SMITH (*The Benjamin Electric, Ltd.*).
18.	(a) A 500-watt Flameproof Floodlight. (b) A Floodlight designed to operate a 400-watt High Pressure Lamp burning in a horizontal position without Deflector.	Mr. J. E. PARKER (*The General Electric Co., Ltd.*).
19.	(a) A 24″ Shadowless Operating Theatre Fitting with Special Telescopic Downrod Suspension. (b) A Diffusing Glass Fitting arranged to take a Combination of Tungsten and Electric Discharge Lighting.	Mr. J. M. SANDFORD (*The General Electric Co., Ltd.*).
20.	New Lighting Units, Submersible Type Projectors, etc.	Mr. A. MANSELL (*The Edison Swan Electric Co., Ltd.*).
21.	Studio Lighting Unit.	Mr. G. S. BARRETT (*The General Electric Co., Ltd.*).
22.	New Applications for Cornice Lighting. A Lighting Device for Chemical Titrations.	Mr. HAROLD BRIGHT.
23.	Silvagrey Interchangeable Neon Signs, etc.	Mr. W. WORTHINGTON (*Silvagrey Electric, Ltd.*).
24.	Decorative Gas Lighting Units.	Mr. W. BLOWES (*Falk Stadelmann and Co., Ltd.*).
25.	Decorative Gas Lighting Units.	Mr. W. MORRIS (*Evered and Co., Ltd.*).
26.	Aviation Lighting.	Mr. K. V. MCKENZIE (*The General Electric Co., Ltd.*).
27.	Lamp with Prismatic Ring and Fittings.	Dr. D. STARKIE (*The Amplilux Lighting and Illumination Co., Ltd.*).

MISCELLANEOUS EXHIBITS.

28.	Newbridge Mark III. "Comet" Igniter for use with Square Street Lanterns and Other Exhibits.	Mr. S. F. BAKER (*The Horstmann Gear Co., Ltd.*).
29.	Display of Photographs Illustrating Research.	Mr. T. C. ANGUS (*London School of Hygiene and Tropical Medicine.*).
30.	Lighting Units for Gas Meter Testing Apparatus.	Mr. H. C. COOPER (*Mek-Elek Engineering, Ltd.*).

The Illuminating Engineering Society is not, as a body, responsible for the opinions expressed by individual authors or speakers.

With a view to avoiding possible confusion with other publications, reference to these Transactions should be in the form:—"Trans. Illum. Eng. Soc. (London)."

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